

REMARKS

In the Office Action, the Examiner indicated that claims 1-19 are pending in the application and that all of the pending claims are rejected. By this amendment, claims 1, 5, 7, 8, 10, and 12 have been amended, and claims 14 and 17 have been cancelled.

Rejection Under 35 U.S.C. §103

On page 2 of the Office Action, the Examiner has rejected claims 1-7 and 14-16 under 35 U.S.C. §103(a) as being unpatentable over Hershbarger et al. (U.S. Patent No. 5,654,984) in view of Luscher, Jr. (U.S. Patent No. 5,600,551).

On page 5 of the Office Action, the Examiner has rejected claims 8-13 and 17-19 under 35 U.S.C. §103(a) as being unpatentable over Hein (U.S. Patent No. 6,198,816 B1) in view of Luscher, Jr.

To support a rejection under 35 U.S.C. §103, a reason, suggestion, or motivation to lead an inventor to combine two or more references must be found. *Pro-Mold and Tool Co. v. Great Lakes Plastics Inc.*, 37 U.S.P.Q.2d 1627, 1629 (Fed.Cir. 1996). The Examiner has not met his burden in establishing a reason, suggestion, or motivation for combining the cited references, as discussed below.

The Present Invention

The present invention relates to an interface utilizing existing clock signals from a driver circuit, such as a DSP, to charge capacitors that are normally used for capacitive coupling of digital data across a high voltage isolation barrier. A clock regeneration circuit is included to regenerate the clock signals used to charge the capacitors, thereby effectively

preserving the integrity of the clock so that it can be used, for example, to generate a timing event.

Using relatively small capacitors (e.g., capacitors in the range between 10 pF and 500 pF, and preferably at 100 pF) a charge pump is formed to generate power to the interface at all times. Thus, the interface always has a steady source of power available for use, including during the on-hook state, for powering circuitry that can detect, modulate, and transmit on-hook signals across the capacitive interface, and also has a clock available for timing events as described above.

The claimed invention includes circuitry that doubles the voltage of the clock signal coming from the DSP, thereby obtaining more power for use by a data access arrangement (DAA) coupled to the interface and, therefore to the DSP. Further, the interface circuit is a fully differential circuit, thereby eliminating the need to keep the impedance across the capacitive coupling low, as is required when using a pseudo-differential interface circuit.

Hershbarger et al., U.S. Patent No. 5,664,984

U.S. Patent No. 5,664,984 to Hershbarger et al. teaches a method and apparatus for communicating a modulated signal across an isolation barrier using capacitors, similar to the capacitive isolation barrier of Hein et al. (discussed below). Like Hein, Hershbarger utilizes a pseudo-differential circuit which is thus very sensitive to impedance, thereby requiring that the capacitive coupling have a high value, e.g., 10,000 pF. Hershbarger is relied upon by the Examiner for its teaching of the use of a DSP with a charge pump for high voltage isolation for a DAA.

Hein et al., U.S. Patent No. US 6,198,816 B1

U.S. Patent No. 6,198,816 to Hein et al. teaches a communication system utilizing a capacitive isolation barrier to linearly attenuate the tip/ring signal voltage levels from the high phone line levels to levels within integrated circuit technology limitations. The Hein isolation circuit illustrated, for example, in Fig. 13A and Fig. 13B, is a pseudo-differential circuit. For example, receiver 262 of Fig. 13b is not a differential receiver. At best, it illustrates a pseudo-differential circuit.

The capacitive isolation barrier of Hein requires very large capacitors, e.g., at least 10,000 pF. With the large capacitances required by Hein, the impedance is low with respect to the signals across the capacitance; thus, what is done by Hein to avoid the extensive filtering that must be utilized to filter out existing common mode signals and also common mode signals generated by the interface itself if lower capacitances were used in connection with the pseudo-differential circuit.

Luscher, Jr., U.S. Patent No. 5,600,551

U.S. Patent No. 5,600,551 to Luscher, Jr. teaches a voltage multiplier and capacitive isolation power supply using capacitors, diodes and first and second clock signals that are out of phase with respect to each other. When the first clock signal is high and the second clock signal is low, a capacitor in a first stage transfers charge to a capacitor in a second stage. When the first clock signal is low and the second clock signal is high, the capacitor in the second stage transfers charge to an output capacitor, and the capacitor in the first stage is recharged via a feedback diode between a capacitor connected to a ground potential and the capacitor in the first stage. Additionally, the capacitors in

each of the stages provide an isolation function for the power supply.

**The Claimed Invention Is Not Taught or Suggested by
Hershbarger, Hein or Luscher, Either Alone or in Combination**

As noted above, to support a rejection under 35 U.S.C. §103, the cited references must suggest a reason, suggestion, or motivation to lead an inventor to combine two or more references must be found. None of the references cited by the Examiner teach or suggest a driver circuit, such as a charge pump, which doubles the voltage of a clock signal provided by the driver circuit to thus increase the voltage available for use by a DAA and regenerates the clock signal so that it is also available to perform its clocking function. In addition, none of Hershbarger, Hein, or Luscher teach or suggest the use of a fully differential signal processing circuit and thus require very large value capacitors and/or filtering elements if the size of the capacitors are reduced.

The claims of the present invention, as amended, positively recite these novel and distinguishing features (claim 1, "A fully differential interface circuit ... having a clock generator generating a clock signal ... a clock regeneration element ... said clock regeneration element regenerating a clock signal that is essentially identical to the clock signal generated by said clock generator"; claim 7, "A method of providing power to a data access arrangement in an interface circuit ... said method comprising the steps of ... generating a power signal ... across said charge pump by inputting the output of said clock generator to said charge pump ... regenerating a clock signal essentially identical to said output of said clock generator"; claim 8, "A fully differential interface circuit ... a driver circuit ... said driver circuit including a clock generator generating a clock signal ... a clock regeneration element ... said clock regeneration element regenerating a clock signal

that is essentially identical to the clock signal generated by the clock generator"). Since none of these elements are taught or suggested by any of Hershbarger, Hein or Luscher, it is submitted that the claims, as amended, patentably define over the cited references.

Applicants maintain their assertion that the claimed invention is a fully differential circuit, and assert herein that in addition to Hein and Hershbarger being pseudo-differential circuits, Luscher is also not a fully differential circuit.

The present invention uses a differential charge pump and differential transmission circuit because of undesirable common mode voltages. The circuits of Hein, Hershbarger and/or Luscher will fail in the presence of a large common mode voltage. This is apparent to one of ordinary skill in the art. By contrast, the present invention rejects common mode voltages of any level, regardless of the value of the capacitors. As an example, a typical 150 volt peak-to-peak common mode voltage presented across the Hein circuit will cause it to fail, while the same 150 volt peak-to-peak voltage across the present invention will not inhibit the present invention in any way.

The present invention patentably defines over the cited references and is thus in condition for allowance. The Examiner is respectfully requested to reconsider and withdraw his rejection of the claims under 35 U.S.C. §103.

Conclusion

The claims, as amended, patentably define over the prior art cited by the Examiner in rejecting the claims. Accordingly, reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

Respectfully submitted,

Dated: May 6, 2003



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